

PH, pKa, Acids, Bases and Buffers.

Problems , Excercises:

A. Define and give examples wherever applicable.

1. Acids and Bases
2. Conjugate acid-conjugate base pair
3. Strong acid and strong base
4. Weak acid and weak base
5. The ion product of water
6. Neutrality
7. PH
8. Titration, titration curve
9. PKa
10. Henderson-Hasselbalch equation
11. Buffer
12. Buffering capacity

B. Explain

1. Why do buffers, which are made from weak acids and bases, resist pH changes better than strong acids and bases in the physiological range of pH?
2. A series of enzyme assays is to be performed at pH 7.0. Why would phosphate be a good choice of buffer? Which species of phosphate would predominate at pH 7.0?

C. Calculate

1. The pH for hydrogen ion concentrations of
 - a. $1 \times 10^{-6} \text{ M}$
 - b. $2 \times 10^{-6} \text{ M}$
 - c. $4 \times 10^{-6} \text{ M}$
 - d. $6 \times 10^{-6} \text{ M}$
 - e. $8 \times 10^{-6} \text{ M}$
 - f. $1 \times 10^{-5} \text{ M}$
2. The hydrogen ion concentration for the normal limits of blood pH: 7.37 and 7.43
3. The hydrogen ion concentration at $[\text{OH}^-] = 5 \times 10^{-5}$.
4. The approximate pH of a 10^{-8} M solution of HCl.
5. The endpoint of the titration of NH_3 with strong acid.
6. The ration of acetate ion / acetic acid in an acetate buffer at pH 3, 4, 5, and 6.
7. The final pH when 5 mmols KOH is added to 1 L of $4 \times 10^{-3} \text{ M}$ HCl. (For simplicity, assume that the final volume is not changed significantly)

Note: Answers will be posted soon